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/CONNECTICUT RIVER FLOOD CONTROL

MANUAL
OF
RESERVOIR REGULATION

SURRY MOUNTAIN
RESERVOIR

ASHUELOT RIVER BASIN - NEW HAMPSHIRE



CORPS OF ENGINEERS. U. S. ARMY

OFFICE OF THE DIVISION ENGINEER

NEW ENGLAND DIVISION, BOSTON, MASSACHUSETTS

APRIL 1951

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MANUAL OF RESERVOIR REGULATION

SURRY MOUNTAIN RESERVOIR

1. Scope. - The purpose of this manual is to prescribe the basic regulations for hydrologic reporting and the hydraulic operation of Surry Mountain Reservoir during periods of normal and flood flows. This manual will serve as a guide and ready reference for the use of the Reservoir Regulation Section of the New England Division Office as well as for the damtender.

2. Description. - Surry Mountain Dam is located on the main branch of the Ashuelot River, 34.6 miles above its confluence with the Connecticut, in the town of Surry, Cheshire County, New Hampshire. The reservoir has a flood control capacity of 32,500 acre-feet equivalent to 6.1 inches of run-off from the drainage area of 100 square miles.

3. Purpose of Reservoir. - The purpose of the Surry Mountain Reservoir is to provide flood protection for the downstream communities of Keene, West Swanzey, Westport, Winchester, and Hinsdale within the drainage basin of the Ashuelot River and, in conjunction with other flood control reservoirs in the Connecticut River Basin, to contribute to the flood protection of the urban and industrial centers along the banks of the Connecticut River downstream from the mouth of the Ashuelot River.

4. Responsibilities. - The Reservoir Regulation Section in the New England Division Office will coordinate and is responsible for the regulation of all reservoirs. The damtender is responsible for

observing and reporting all hydrologic conditions that may necessitate reservoir regulation and shall operate the gates in accordance with instructions received from the Chief of the Reservoir Regulation Section or his designated assistants. In the event communications fail during a flood period, the damtender is responsible for the regulation of the reservoir in accordance with paragraph 17.

5. Regulation of Reservoir - Normal Periods. - a. General. -

Both gates of the reservoir will normally be open 3 feet. For minor fluctuations, the gates will remain at 3 feet until the pool reaches a height of 10 feet, at which time the Reservoir Regulation Section shall be notified. The gates will be left in the above fixed position, provided the safe downstream channel capacities are not exceeded as described in paragraph 7. Approval shall be obtained from the Chief, Reservoir Regulation Section, to store additional water for any reason. Such a pool will be retained for a minimum period of time and then emptied as rapidly as downstream channel capacities will permit. Complete records shall be made of all gate operations.

b. Operation During Freezing Weather. - During the winter months a pool not exceeding a gage height of 14.0 feet may be maintained to facilitate gate operations.

c. Trash Removal. - Approval from the Chief, Reservoir Regulation Section shall be obtained for raising the pool elevation to facilitate trash removal. Sufficient water must be released to satisfy minimum requirements of downstream water users.

d. Cooperation with Downstream Water Users. - It is the policy of the Corps of Engineers to cooperate, whenever possible, with downstream water users, police authorities, and other interested parties and agencies. The damtender may be requested to modify the river flow for short periods of time to facilitate repairs. Whenever a request for such modification is received, the damtender shall ascertain the validity of the request and obtain assurances from all other downstream water users that they are agreeable to the proposed operation. The damtender will then relay the information to the Reservoir Regulation Section and request instructions.

6. Observations of Flood Conditions. - The United States Weather Bureau and other cooperating agencies furnish information to the Reservoir Regulation Section relative to general storm and snow-melt conditions and river stages throughout the Connecticut River Basin. It is the responsibility of the damtender to obtain current information on run-off conditions and river stages within the Ashuelot River Basin.

7. Damage Control Points. - Information obtained from observations during past floods indicate that the elevations and stages indicative of safe channel capacities downstream from Surry Mountain Dam are as follows:

a. Sewage Pumping Station. - An elevation of about 472.5 at the Telemark gage near the Keene Sewage Pumping Station. Nuisance damage commences at this elevation with material damage starting at about 474. The Telemark gage is the index point for the reach of the

Ashuelot River between the Faulkner & Colony Dam and the mouth of Otter Brook which is the most critical damage area between the reservoir and the mouth of the Ashuelot River.

b. Winchester Street. - A stage of about 7.0 at the Winchester Street gage in Keene.

c. Winchester Gage. - A stage of 15.0 at the staff gage located just downstream of the highway bridge in Winchester.

d. Other Damage Points. - It will also be the duty of the damtender to obtain further information along the Ashuelot River to establish accurate stages of nuisance and material damage. Such observations may reveal new damage control points which would be more indicative of critical conditions for reservoir regulation.

8. Conditions that Warrant a Report. - The damtender should report any of the following conditions promptly to the Reservoir Regulation Section (telephone numbers are listed in Table No. 1):

a. Occurrence of $3/4$ inch of precipitation within 24 hours, at either the dam or one of the cooperative rainfall stations.

b. A river elevation of 468 and rising at the Telemark gage near the Keene Sewage Pumping Station.

c. A reservoir stage of 10 feet and rising.

9. Scope of Report. - Insofar as practicable, the following information should be included in the report to the Reservoir Regulation Section:

a. The total amount of precipitation which has fallen up to the time of reporting, with several intermediate amounts and the times of observation.

b. The pool elevation at the time of reporting and several previous readings with the corresponding time to define the hydrograph or rate of rise of the pool. Accurate, simultaneous readings of both stage and time are essential to facilitate computations.

c. Gate openings and discharges at the time of reporting and at the beginning of the storm.

d. Reports of precipitation received from other sources.

e. River elevation at the Telemark gage, Winchester Street gage and other pertinent locations.

f. General snow cover and run-off conditions throughout the basin.

g. Any other information which might be of assistance in regulating the reservoir.

10. Reservoir Regulation for Flood Conditions. - a. The reservoir will be regulated primarily for the protection of Keene and whenever floods on the Ashuelot or Connecticut Rivers approach or exceed damage stage at any of the downstream control points.

b. When a flood on the Ashuelot River or Connecticut River is imminent, it is emphasized that it is preferable to operate the gates prematurely and perhaps unnecessarily than to delay operation until material damage has been caused. It is also essential that operation of the gates be governed by the first critical conditions during the development of a flood whether it be located along the Ashuelot River or Connecticut River.

c. Although the critical damage control point is in

Keene as previously described, in general the regulation of flow from the reservoir will be based on the stage at the Telemark gage located near the Keene Sewage Pumping Station. The allowable reservoir discharge, as shown on Plate Nos. 8 and 9 is a function of the river elevation, the rate of rise in feet per hour at the Telemark gage, and the concurrent reservoir stage. Considerable judgment must be exercised in the use of the curves on these plates with due consideration given to the following factors: a four-hour travel time of flow from the reservoir to the Telemark gage; amount and rate of precipitation; run-off conditions; and the time elapsed from the beginning of the storm. Observations at the Telemark gage should be obtained every 2 hours when the rate of rise does not exceed 0.2 feet per hour and at least hourly if the rate exceeds this amount.

d. All regulation for the Connecticut River as described in the following paragraphs is subject to modification by the Reservoir Regulation Section depending on flood conditions on the Ashuelot River, the available storage capacity of the Surry Mountain Reservoir, and forecast weather conditions.

11. Details of Reservoir Regulation. - Regulation of flow from Surry Mountain Reservoir may be considered in 3 phases during the course of the flood, namely: Phase I, initial regulation during the development of the flood: Phase II, regulation during the flood period: and Phase III, emptying the reservoir following the recession of the flood. Conditions governing the regulation of flow are described below:

12. Phase I - Initial Regulation of Flow. - a. Generally the reservoir regulation during Phase I, as described herein, applies only during the early development of a flood and with a reservoir stage not exceeding 25 feet and rising.

b. Complete closure of gates will be made at once for any of the following conditions and for any unpredictable conditions that may cause flood flows to exceed downstream channel capacities:

(1) When a rainfall of 2 inches occurs within a 24-hour period.

(2) When elevations and rates of rise at the Telemark gage occur as follows (See Plate No. 8):

<u>ELEVATION</u> <u>(in feet)</u>	<u>RATE OF RISE</u> <u>(in feet per hour)</u>
471	0.2 or more
470	0.4 " "
469	0.6 " "
468	0.8 " "

(3) A forecast maximum stage of 28 feet or more on the Connecticut River at Montague City.

c. Partial gate closure will be used for minor or slow rising floods not warranting a complete closure of gates or during the development of a major flood prior to a full appraisal of its magnitude, as governed by any of the following conditions:

(1) To restrict the reservoir discharge in accordance with the curves shown on Plate No. 8 which prescribes the maximum

allowable reservoir discharge in terms of the river elevation and rate of rise at the Telemark gage on the Ashuelot River in Keene.

(2) To restrict the contribution from the reservoir when the maximum forecast stage on the Connecticut River at Montague City approaches a flood stage of 28 feet.

d. Secondary river rises from additional rainfall or snowmelt will be considered applicable to Phase I only when the reservoir stage remains below 25 feet. For such conditions the reservoir discharge will conform to the rule curves on Plate No. 8. If a secondary river rise occurs with reservoir stages higher than 25 feet, Phase II regulation becomes effective.

13. Phase II - Continuation of Regulation. - a. Generally the transition from Phase I to Phase II occurs when the river stage at the Telemark gage in Keene has either stabilized, exceeded flood stage elevation of 472.5 or started to recede.

b. Ordinarily during the initial phase of regulation, the reservoir storage is utilized to eliminate nuisance and material damage in Keene. However, experience has shown that it is necessary to vary the regulation in accordance with the amount of reservoir storage utilized, elevation of water in Keene, water content of snow remaining on the watershed, and weather forecasts. It is impossible to evaluate all of the variable conditions and to stipulate fixed rules of operation for the many combinations of flood conditions that may occur. In general, during the course of a flood, the continuation of regulation will be governed by the reservoir storage utilized and elevation at the Telemark gage in Keene as shown on Plate No. 9.

c. Due to the agricultural usage of the land bordering the Ashuelot River, the nuisance damage stages will vary with the seasons. To minimize damage to cultivated areas and bank erosion, the maximum discharge from the reservoir will be governed by the following conditions:

<u>Time of Year</u>	<u>Reservoir Stage (in feet)</u>	<u>Maximum Reservoir Discharge (in c.f.s.)</u>
November 1 to May 15	0-15	600
" "	15-20	800
" "	20-65	1,000
May 16 to October 31	0-30	600
" "	30-45	800
" "	45-65	1,000

d. Secondary river rises from snowmelt or additional rainfall will be considered applicable to Phase II when the reservoir stage exceeds 25 feet. Reservoir discharges, for such conditions, will conform to the rule curves shown on Plate No. 9. With rising stages at the Telemark gage in Keene, consideration will be given to the 4-hour travel time between the dam and Keene in order to anticipate river stages.

e. Usually the above conditions will govern the continuation of regulation, but in some cases flood conditions on the Connecticut River will be the controlling criteria. The regulation will be continued until the stage of the Connecticut River at Montague City has either receded 5 feet from flood crest, or to flood stage of 28 feet.

14. Phase III - Emptying the Reservoir. - a. Following the recession of the flood on the Ashuelot River at Keene, or the Connecticut River at Montague City, the reservoir will be emptied as rapidly as possible in accordance with prescribed discharges shown on Plate No. 9, and the seasonal variations indicated in paragraph c of Phase II.

b. The rate of increase in reservoir discharge, under all conditions, shall not exceed 200 c.f.s. per 2-hour period for total discharges up to 600 c.f.s., and 100 c.f.s. per 2-hour period for total discharges from 600 c.f.s. to 1,000 c.f.s. Increasing the discharge to produce stages causing material damage will be done only on instructions from the Reservoir Regulation Section.

c. When releasing water from storage, it is desirable to operate the gates to produce a uniform distribution of flow in the discharge channel. This objective may be effected in the case of two gates by operating each gate at partial opening. If it is found that certain circumstances cause objectionable gate vibrations, the amount or arrangement of the gate openings will be altered to minimize this condition.

d. Following the emptying of the reservoir, the gates will be reset at the prescribed 3-foot openings.

15. Extraordinary Flood Conditions. - It is conceivable that extraordinary and unpredictable flood conditions may arise from dam or bridge failures, highway or railroad washouts, and ice jams or debris deposits. Regulation of the reservoir during such unusual

conditions may not follow the previously described rules, but will be governed by the exigency of the circumstances with the prime purpose of the operation to prevent further damage. The Reservoir Regulation Section will be immediately notified of any unusual flood condition.

16. Spillway Discharge. - Ordinarily during a major flood, the gates will not be opened to avoid spillway discharge. Surchage storage above the elevation of spillway crest will be utilized if the downstream channel capacity continues to be exceeded by the runoff from uncontrolled areas.

17. Regulation with Failure of Communications. - a. Reservoir Regulation Section. - If the damtender is unable to communicate with the Reservoir Regulation Section and it appears necessary to act promptly, the damtender has full authority to operate the gates in accordance with instructions previously described. However, possession of the instructions contained in this manual does not relieve the damtender of his responsibility for continued efforts to communicate with the Division Office. Upon resumption of communications, the regulation of the reservoir will be directed by the Reservoir Regulation Section.

b. Telemark Gage. - If all communications fail with both the Telemark gage and the Reservoir Regulation Section, the damtender or his assistant will travel to Keene to determine flood conditions by inspection. The frequency of trips will be determined by the damtender with consideration being given to the following factors: the

amount and continuation of rainfall; snowmelt conditions; and the elevation and rate of rise of the river in Keene.

c. Regulation. - The damtender will regulate the reservoir discharge very conservatively during Phase I when it is difficult to obtain the necessary information on flood conditions. In the case of any doubt as to whether a partial gate or complete closure should be made, the damtender will close the gates completely whenever the severity of the storm and lack of information concerning downstream conditions warrants such action.

18. Reports - Normal Operations. - The normal operation of the reservoir requires several weekly and monthly reports described as follows:

a. Reservoir Stage. - The automatic water level recorder records the water surface in the reservoir at all times. The recorder hydrograph should be checked each morning to see that the clock is keeping correct time and that the pen is inking properly. Any discrepancies in the pen time or gage height should be noted on the chart. The chart should be changed once a week and on the first of each month. At the beginning and ending of each chart the following information should be noted in ink: (1) outside gage reading, (2) pen gage reading, (3) watch time, and (4) pen time.

b. Gate Operation Record. - All gate operation should be carefully noted on NED Form 91, 3 March 1947, (See Plate No. 18) and inclosed with recorder charts of reservoir stages in the weekly and monthly reports. All operation should be noted regardless of duration

of the change in gate position. The report should include date and time of day, gate opening, reservoir gage height, and reason for operation.

c. Tailwater Gage. - The damtender will check the gage weekly during normal flows and daily during periods of flood flows. The checking of the gage is to make sure that the recorder is in good working order, noting any discrepancies in gage heights and time on the chart at the station and also on the chart of the remote recorder in the operating house. On the first of every month, the damtender will remove that portion of the chart on the remote recorder which contains the gage record. At the beginning and ending of each chart, the following information should be noted in ink: (1) name of gage, (2) date, (3) outside gage reading, (4) pen gage reading, (5) inside gage reading, (6) watch time, (7) pen time, and (8) clock time.

d. Rainfall Data. - The damtender should read the rain gage daily. If less than 1/4" of precipitation has fallen, the pen of the recording gage should be raised to the next heavy line to prevent overlapping records. The operator should check that the clock is running correctly and the pen is inking properly. The chart should be changed each Monday for the weekly report and the first day of each month for the monthly report. The monthly climatological report should be made out according to weather bureau instructions on each pad and included with the monthly report. The weekly report submitted with each recording rain gage chart is used principally to

determine times of beginning and ending and types of precipitation. The method of recording is similar to the monthly report.

e. Snow Courses. - The amount of snow cover will be measured during the late winter and early spring months. Exact dates will be determined each year to coordinate with the published report of the U. S. Geological Survey.

19. Report - Flood Control Operations. - During the regulation of the reservoir for floods, information pertinent to the regulation will be entered in the log book or on prescribed forms for record purposes at the dam. However, if unusual circumstances occur during a flood or upon request of the Reservoir Regulation Section, a report, which may be written in longhand, will be submitted to the Division Office, describing the subjects outlined in the following paragraphs:

a. Log of Reports and Instructions. - A log of all reports and instructions will be maintained by both the damtender and the members of the Reservoir Regulation Section on NED Form 239. A completed sample form showing a typical flood operation is shown on Plate No. 17.

b. Observations at the Dam. - The damtender will make general observations of conditions occurring at the inlet and outlet works, as listed below. The observations will be entered in the log book at the dam. If possible, it is desirable to take photographs of any unusual conditions, noting the date, time, and the reservoir stage height.

(1) Extent and action of eddies and waves along the

spillway and intake channel walls.

(2) Extent and action of turbulence or eddies downstream of the spillway and outlet works.

(3) Effect on the flow through the gates due to an accumulation of ice or debris on the trash racks.

(4) The pool elevation and position of the gate opening at which vibration occurs.

(5) Any other hydraulic phenomena that may occur.

c. Observations at Damage Control Points. - General observations of real damage and nuisance damage will be made along the Ashuelot River below the dam. The report of observations will be used to establish and substantiate the range of damages in those areas to assist in the future operation of the reservoir. The information will be entered in the log book at the dam.

TABLE NO. I
TELEPHONE DIRECTORY

NEW ENGLAND DIVISION OFFICE

TELEPHONE NUMBER DURING OFFICE HOURS - HUEBARD 2 - 8100

<u>NAME</u>	<u>DESIGNATION</u>	<u>NIGHT TELEPHONE</u>	<u>HOME TELEPHONE</u>
<u>Executive Office</u>			
Col. H. J. Woodbury	Division Engineer	HU 2 - 8102	Brookline, Mass. LO 6 - 1457
Major R. B. Burlin	Executive Officer	"	Cambridge, Mass. UN 4 - 3450
<u>Engineering Division</u>			
J. E. Allen	Chief, Engineering Division	HU 2 - 8107	Winchester, Mass. WI 6 - 1431W
H. J. Kropper	Chief, Planning and Reports Branch	HU 2 - 8106	Needham, Mass. NE 3 - 1456J
<u>Operations Division</u>			
H. A. Whitcomb	Chief, Operations Division	HU 2 - 8111	Cranston, R.I. Hopkins 1 - 9348
C. H. Lovejoy	Chief, Maintenance Branch	HU 2 - 8110	Warren, R.I. 1-1832
<u>Reservoir Regulation Section</u>			
E. F. Childs	Chief, Reservoir Regulation Section	HU 2 - 8106	Wellesley, Mass. WE 5 - 0899M
R. S. Restall		"	Mansfield, Mass. 375R
F. C. Merrikin		"	Randolph, Mass. 6 - 0416R
A. M. Harriman		"	Waltham, Mass. 5 - 6588M

TABLE NO. I (Cont'd.)

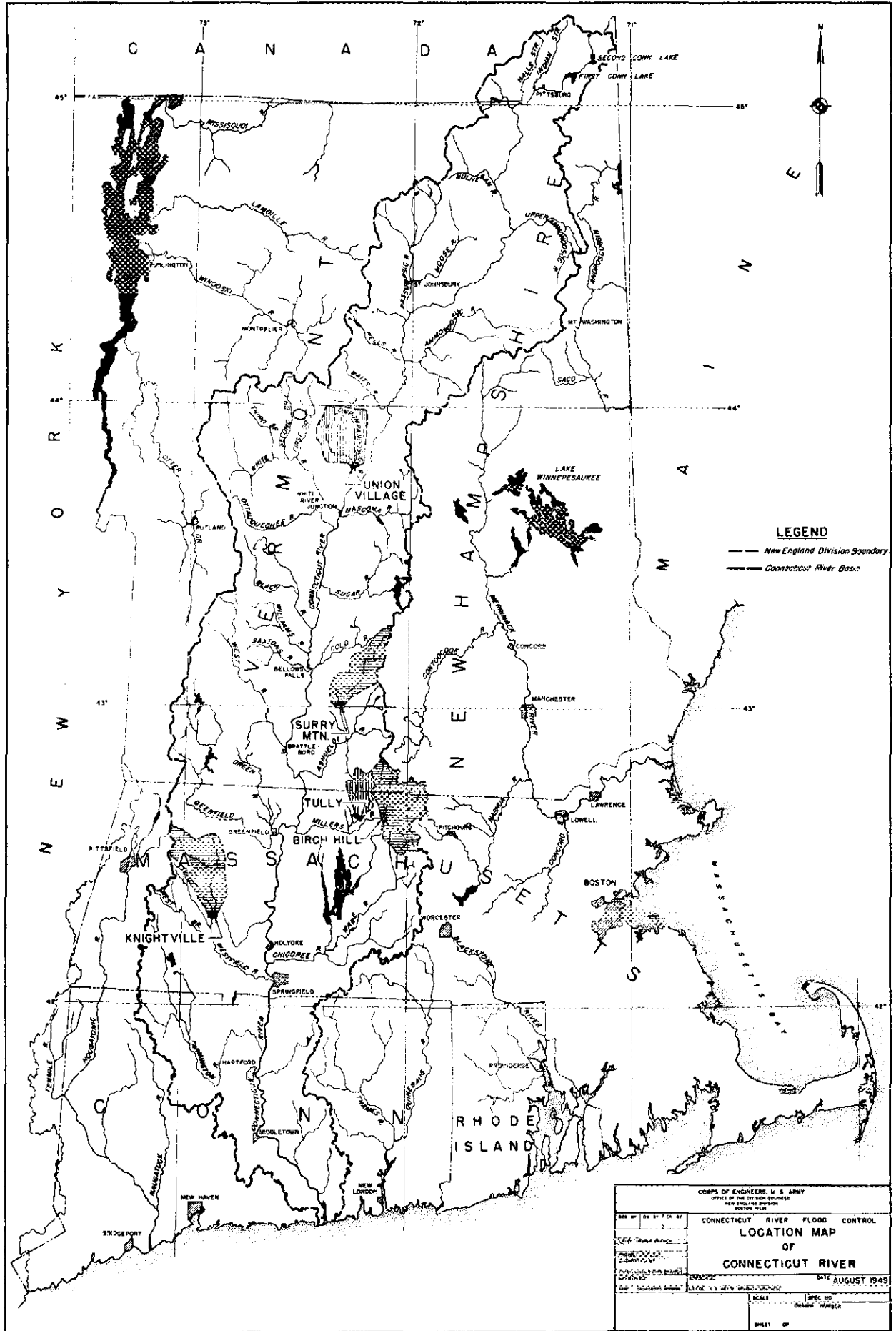
TELEPHONE DIRECTORY

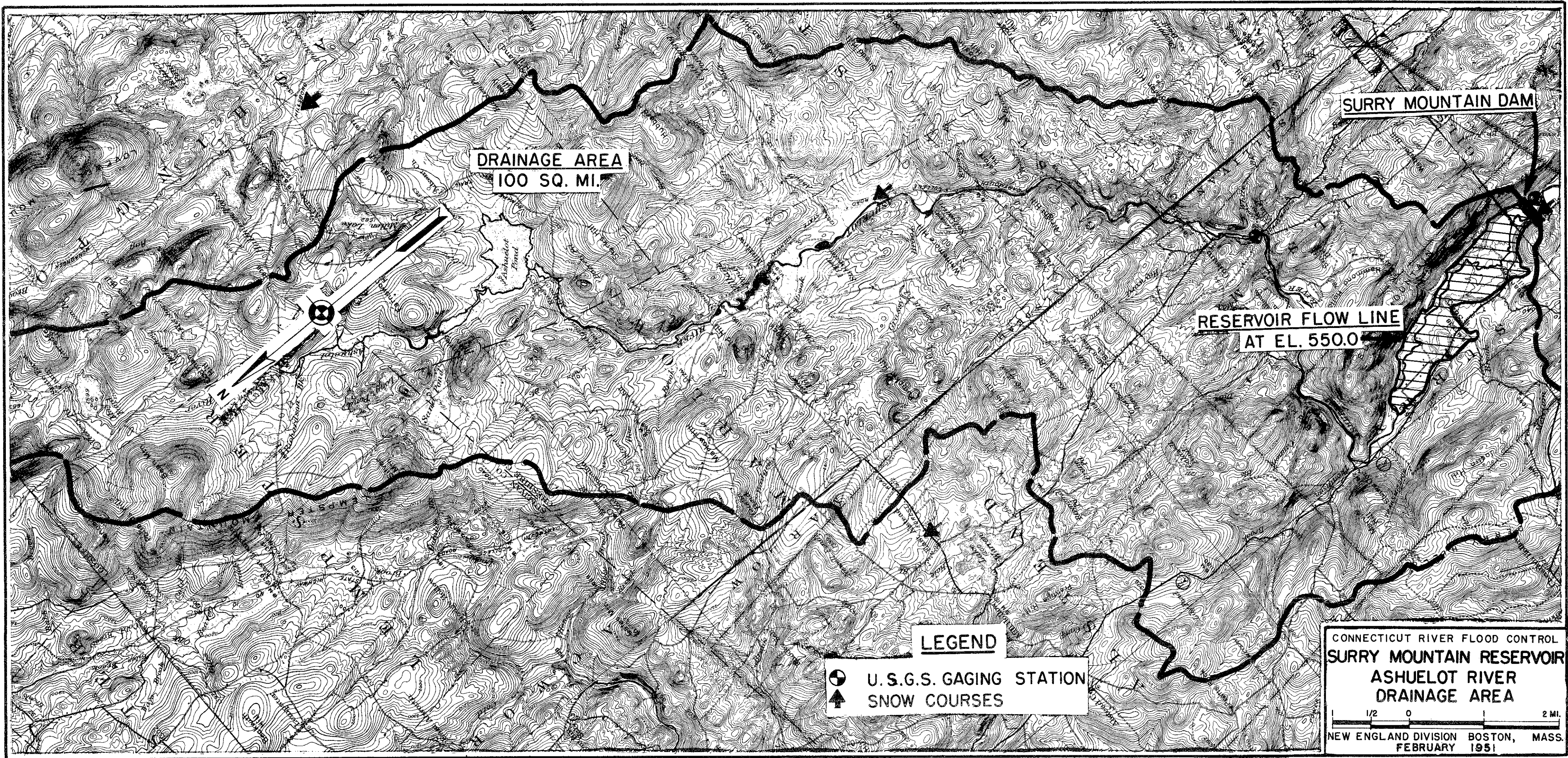
SURRY MOUNTAIN DAM, KEENE, NEW HAMPSHIRE

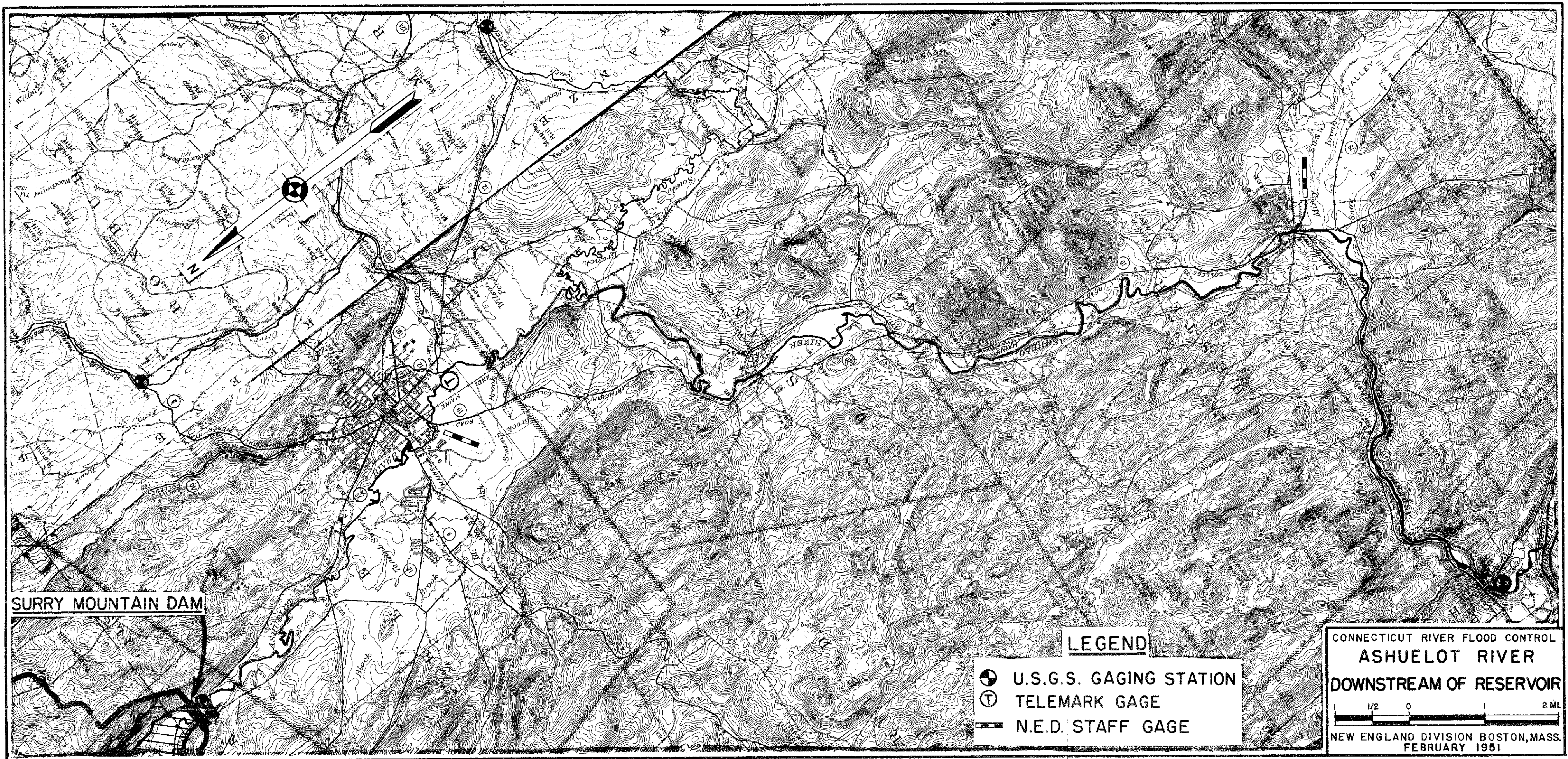
<u>NAME</u>	<u>DESIGNATION</u>	<u>NIGHT TELEPHONE</u>	<u>HOME TELEPHONE</u>
H. G. Lawton	Damtender	Keene 1610	Keene 1610
E. J. Peacock	Ass't. Damtender	Keene 1610	Keene 956W

Telephone numbers of other individuals or agencies commonly called
by the damtender are listed below:

<u>NAME</u>	<u>OFFICE TELEPHONE</u>	<u>HOME TELEPHONE</u>
Chief of Police, City of Keene	Keene 46	
Supt. of Public Works, City of Keene	Keene 1053-M	
Mr. Whalen, Keene Sewage Pumping Station	Keene 1406-W	
Mr. Jack Faulkner Faulkner & Colony Mill	Keene 1886	
Mr. Barnard, Engineer Faulkner & Colony Mill	Keene 1886	Keene 253-W
Mr. Robert Crain, Chief Selectman, Surry		Keene 315-4
Mr. Merton R. Tenney Selectman, Surry		Walpole 107-12
Mr. David M. Malcolm Selectman, Surry		Keene 356-13
State of New Hampshire State Police	Concord 800	







SURRY MOUNTAIN DAM

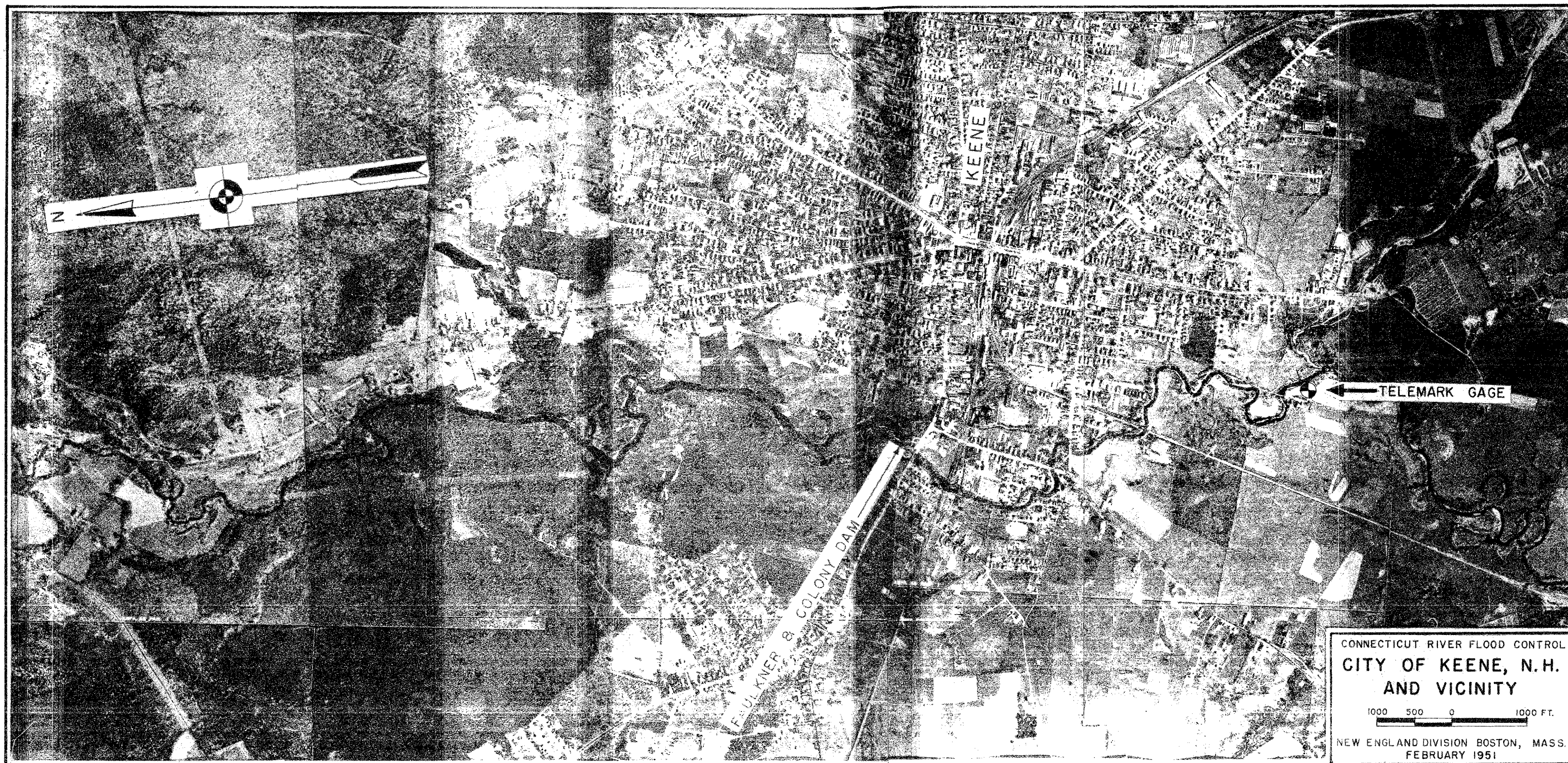
LEGEND

- U.S.G.S. GAGING STATION
- TELEMARK GAGE
- N.E.D. STAFF GAGE

CONNECTICUT RIVER FLOOD CONTROL
ASHUELOT RIVER
DOWNSTREAM OF RESERVOIR

1/2 0 1 2 MI.

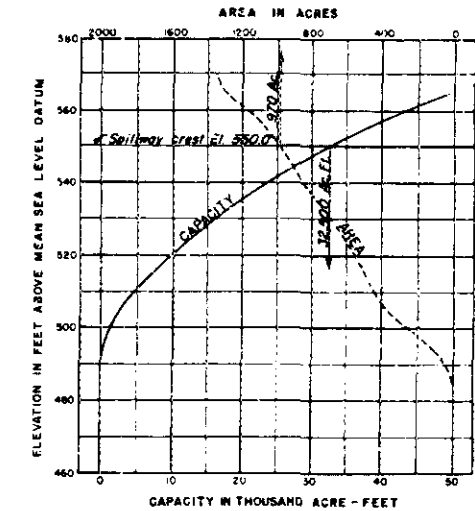
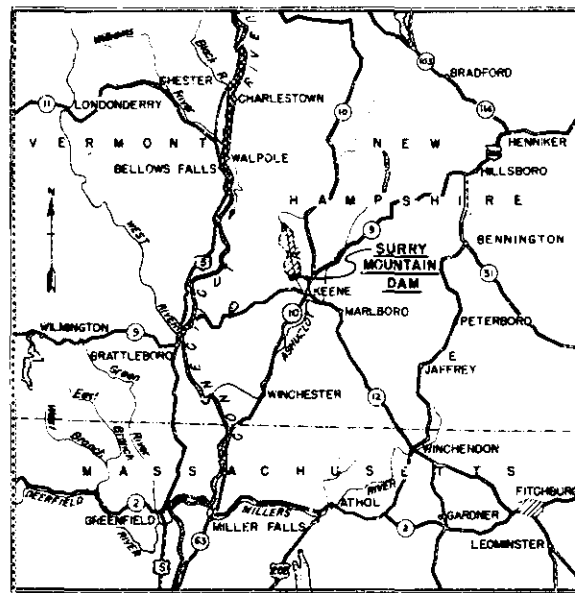
NEW ENGLAND DIVISION BOSTON, MASS.
FEBRUARY 1951



CONNECTICUT RIVER FLOOD CONTROL
CITY OF KEENE, N.H.
AND VICINITY

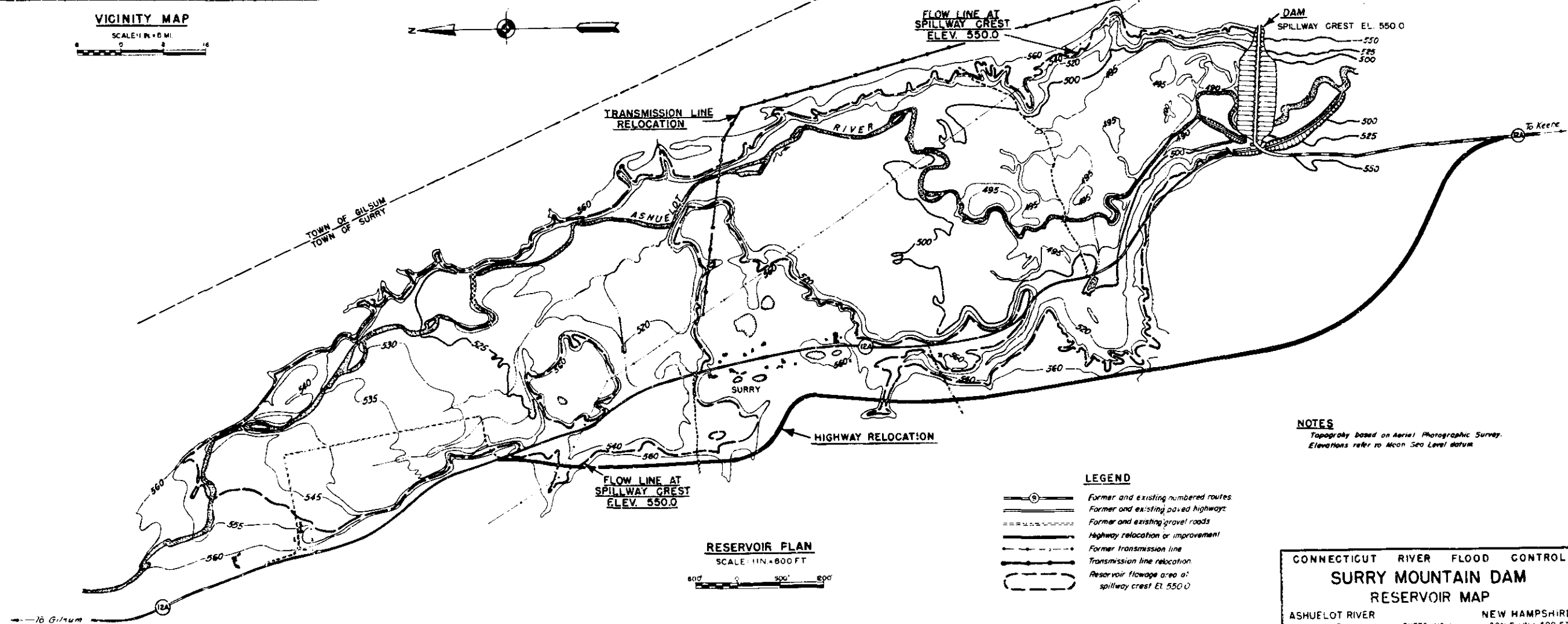
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NEW ENGLAND DIVISION BOSTON, MASS.
FEBRUARY 1951

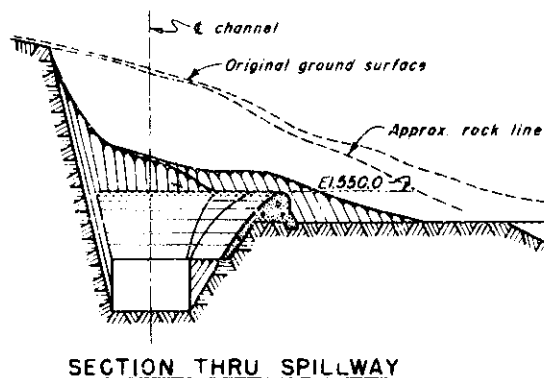
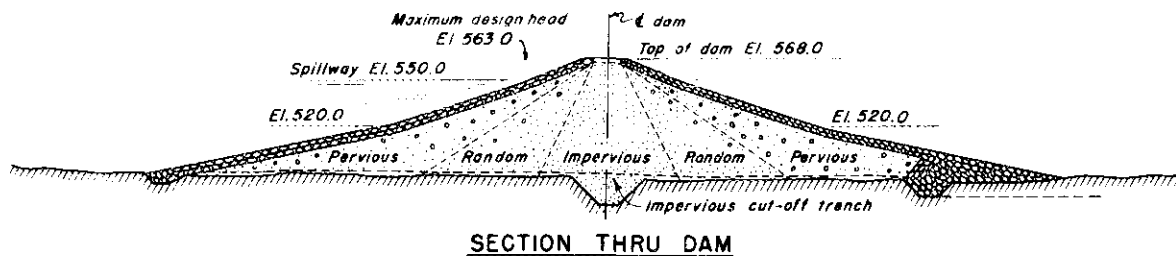
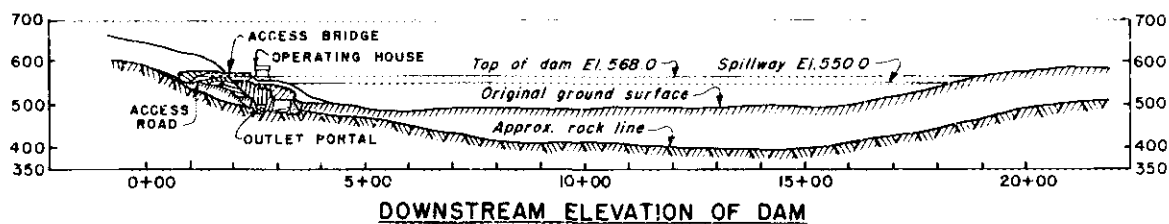
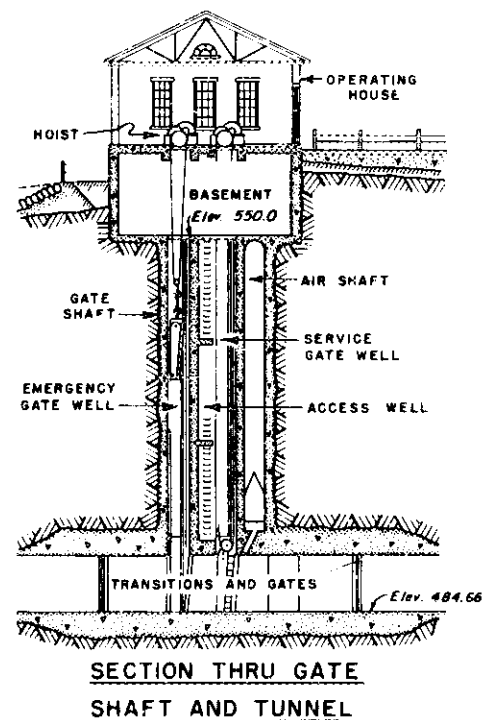
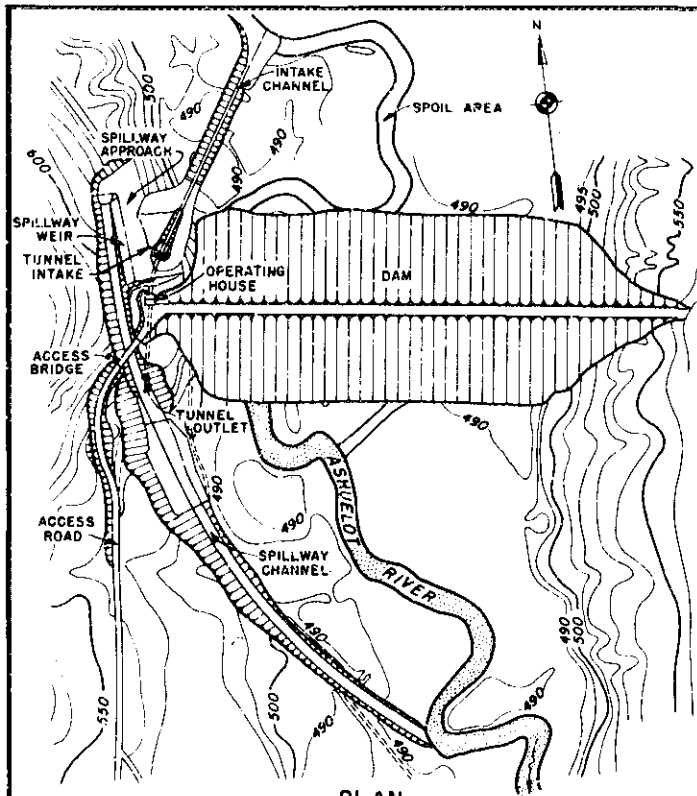


AREA AND CAPACITY CURVES

DRAINAGE AREA 100 SQ. MI.



CONNECTICUT RIVER FLOOD CONTROL	
SURRY MOUNTAIN DAM	
RESERVOIR MAP	
ASHUELOT RIVER	NEW HAMPSHIRE
IN 1 SHEET	SHEET NO. 1
NEW ENGLAND DIVISION, BOSTON, MASS.	FEB. 1947
APPROVAL RECOMMENDED SUBMITTED CHIEF ENGINEER DIVISION	APPROVED BY TO
PROJECT NO.	FILE NO. CT-1-2135



CONNECTICUT RIVER FLOOD CONTROL PROJECTS

SURRY MOUNTAIN DAM PLAN, ELEVATION AND SECTIONS

JUNE 30, 1950

ASHUELOT RIVER

NEW HAMPSHIRE

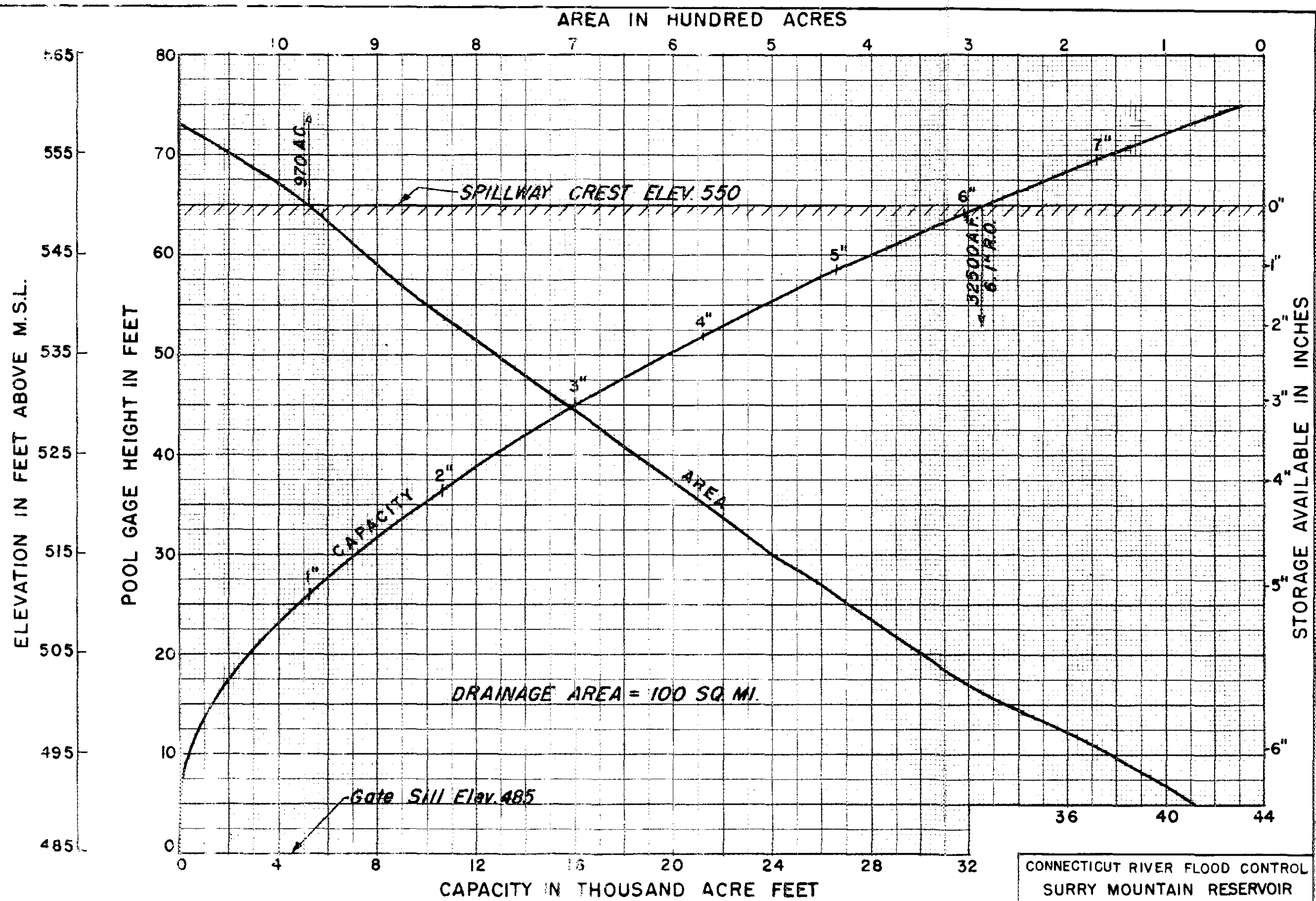
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NOT TO SCALE

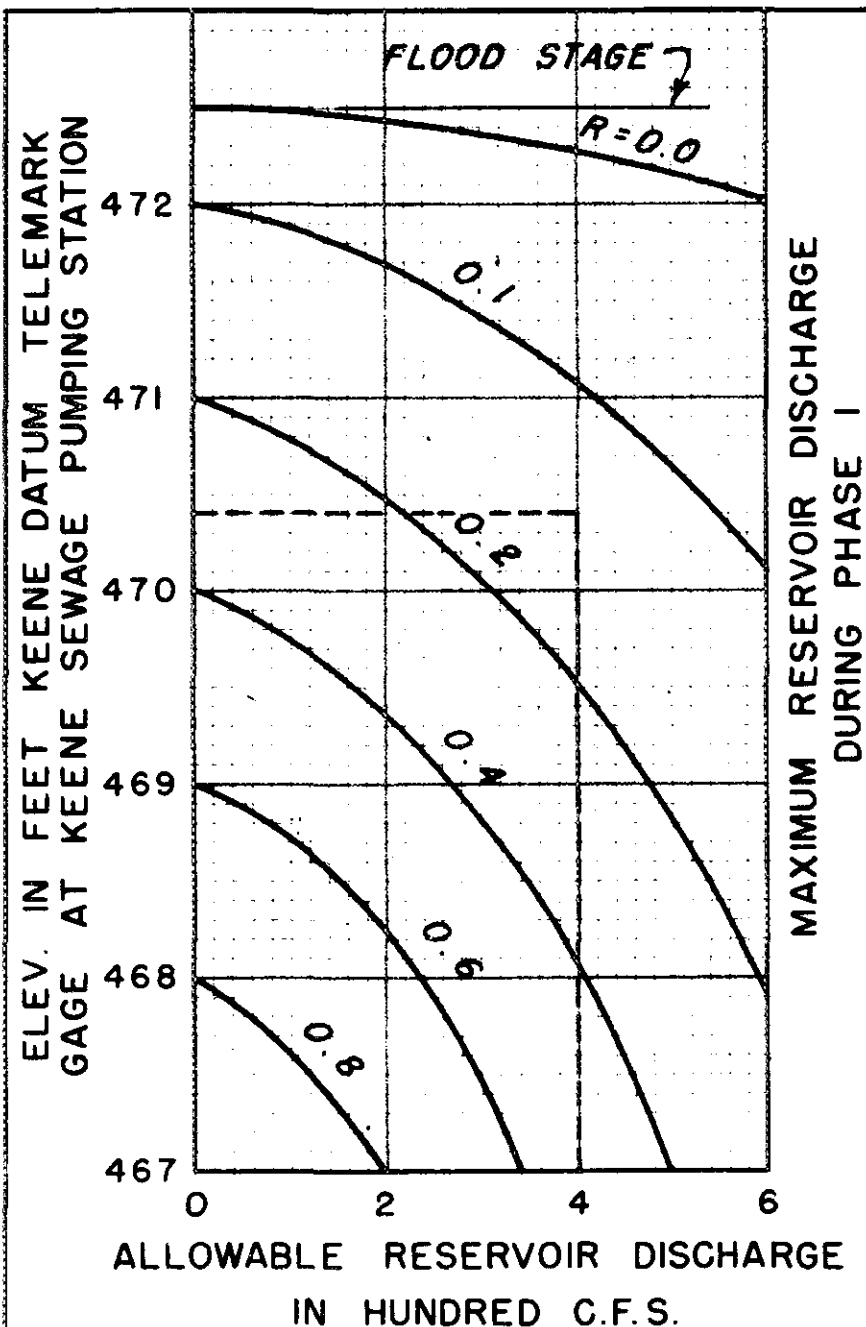
NEW ENGLAND DIVISION,

BOSTON, MASS

[PLATE NO. 6



CONNECTICUT RIVER FLOOD CONTROL
 SURRY MOUNTAIN RESERVOIR
**AREA AND CAPACITY
 CURVES**
 NEW ENGLAND DIVISION., BOSTON, MASS.
 APRIL 1951



APPLICATION OF CURVES

Purpose: - To determine the maximum allowable reservoir discharge during rising stages of the Ashuelot River at the Telemark gage in Keene, based on the elevation and rate of rise in feet per hour at the gage.

Conditions:

1. Phase I, early development of flood.
2. Applicable any time of the year.
3. Reservoir stages from 0 to 25 feet.
4. River stage rising at a rate exceeding 0.1 feet per hour at the Telemark gage in Keene.

Notes:

1. For stages exceeding elev. 472.5 see Plate No. 9.
2. R = rate of rise at the Telemark gage in feet per hour.

Example No. 1:

1. Elev. at Telemark gage 470.1 @ 9:00 p.m.
2. Elev. at Telemark gage 470.4 @ 11:00 p.m.
3. $R = 0.15$ feet per hour.
4. From curves, reservoir discharge is 400 c.f.s.

Example No. 2:

1. Elev. at Telemark gage 469.2 @ 9:00 p.m.
2. Elev. at Telemark gage 469.7 @ 10:00 p.m.
3. $R = 0.5$ feet per hour.
4. From curves, reservoir discharge is zero.

CONNECTICUT RIVER FLOOD CONTROL
 SURRY MOUNTAIN RESERVOIR
 DISCHARGE REGULATION
 INITIAL PHASE OF FLOOD
 NEW ENGLAND DIVISION, BOSTON, MASS
 APRIL 1951

APPLICATION OF CURVES

Purpose: To determine rate of reservoir discharge based on stages of the Ashuelot River at the Telemark gage in Keene and the concurrent stage of the Surry Mountain Reservoir.

Conditions:

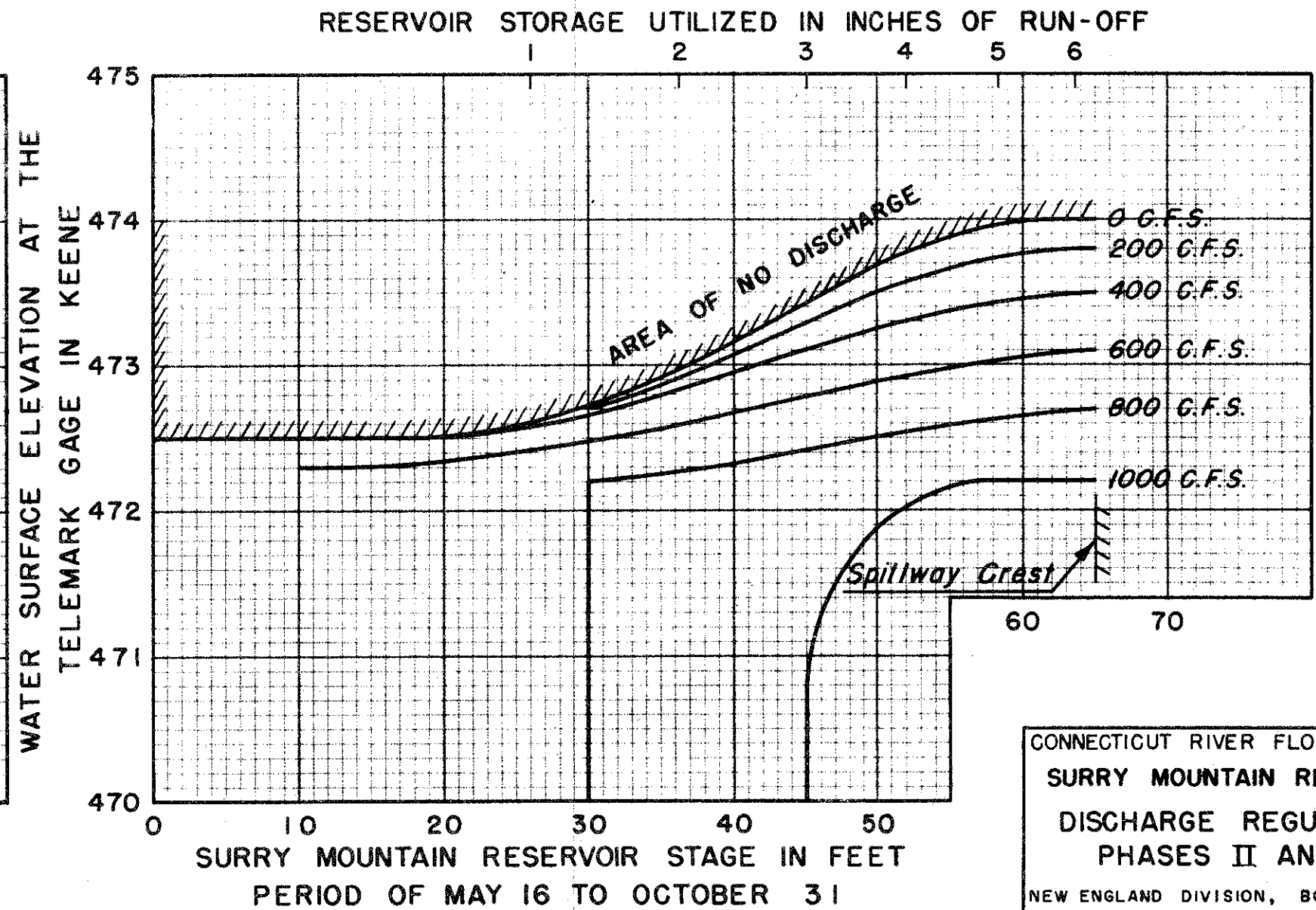
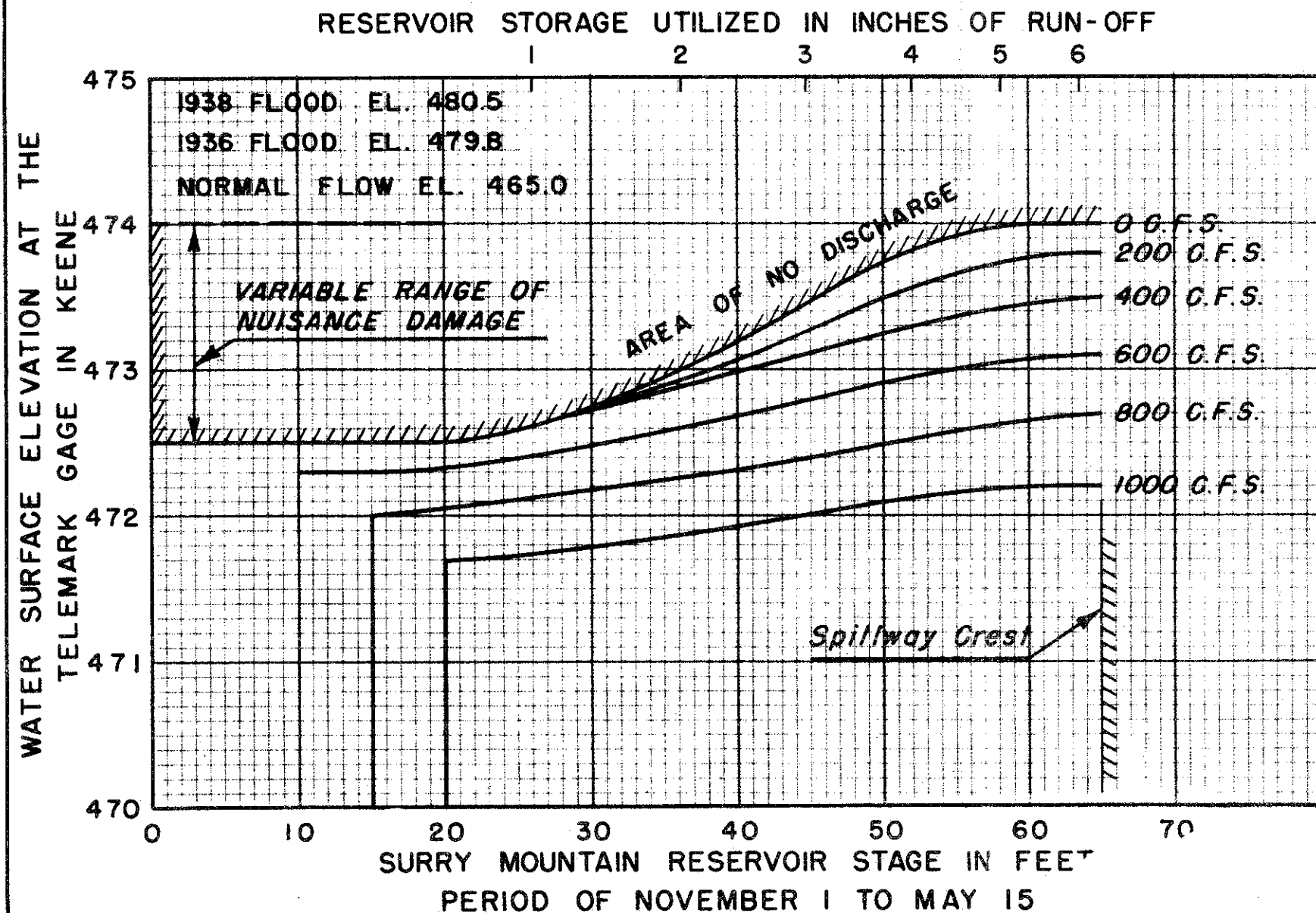
1. Phases II and III - Continuation of Regulation and Emptying the Reservoir.
2. Any reservoir stage.
3. River stage at the Telemark gage in Keene is either steady, receding, or rising at a rate equal to or less than 0.1 feet per hour.

Example No. 1:

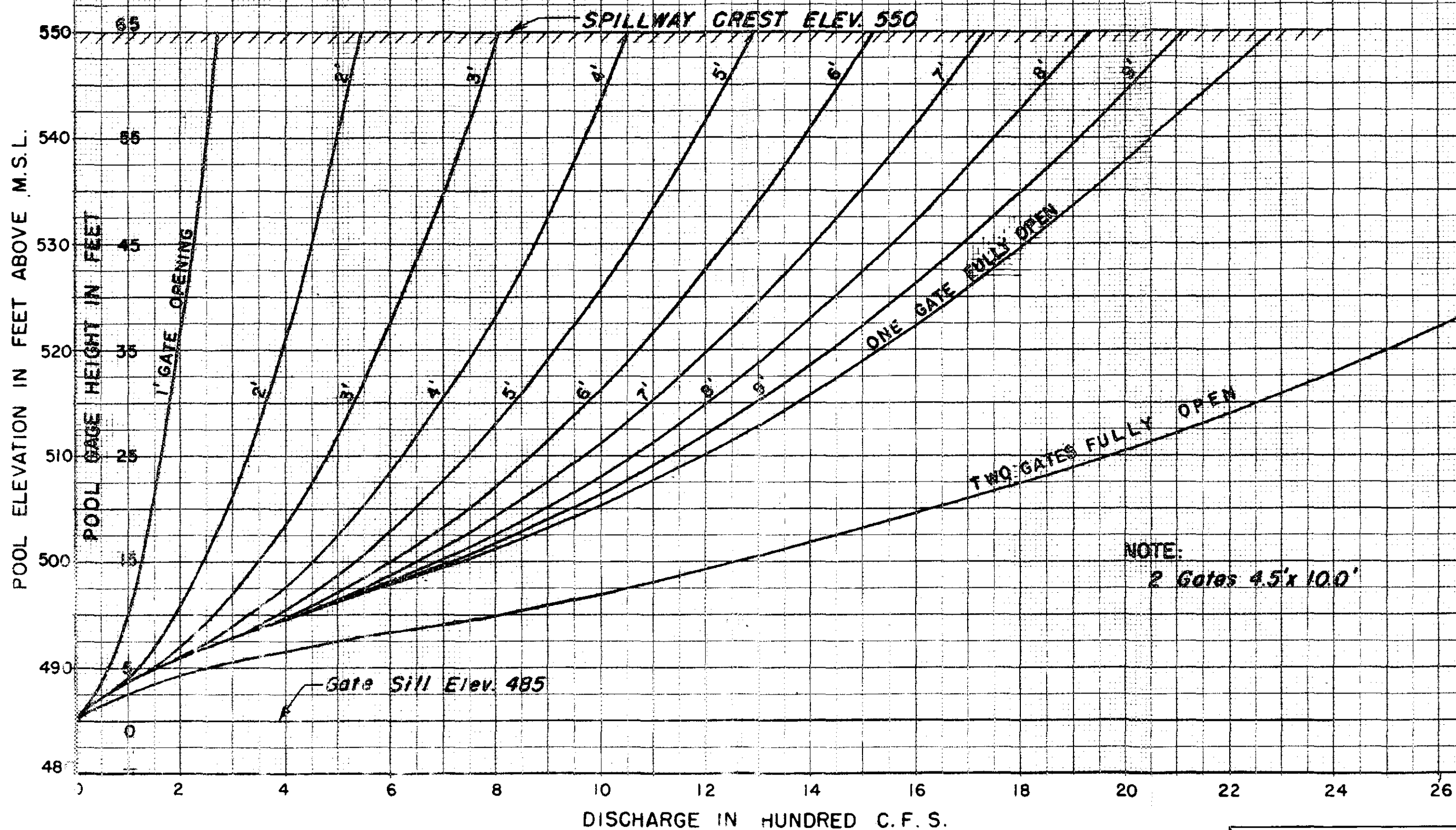
1. Telemark gage = 473.9 (Receding)
2. Reservoir stage = 48.3.
3. From curves, reservoir discharge is zero.

Example No. 2:

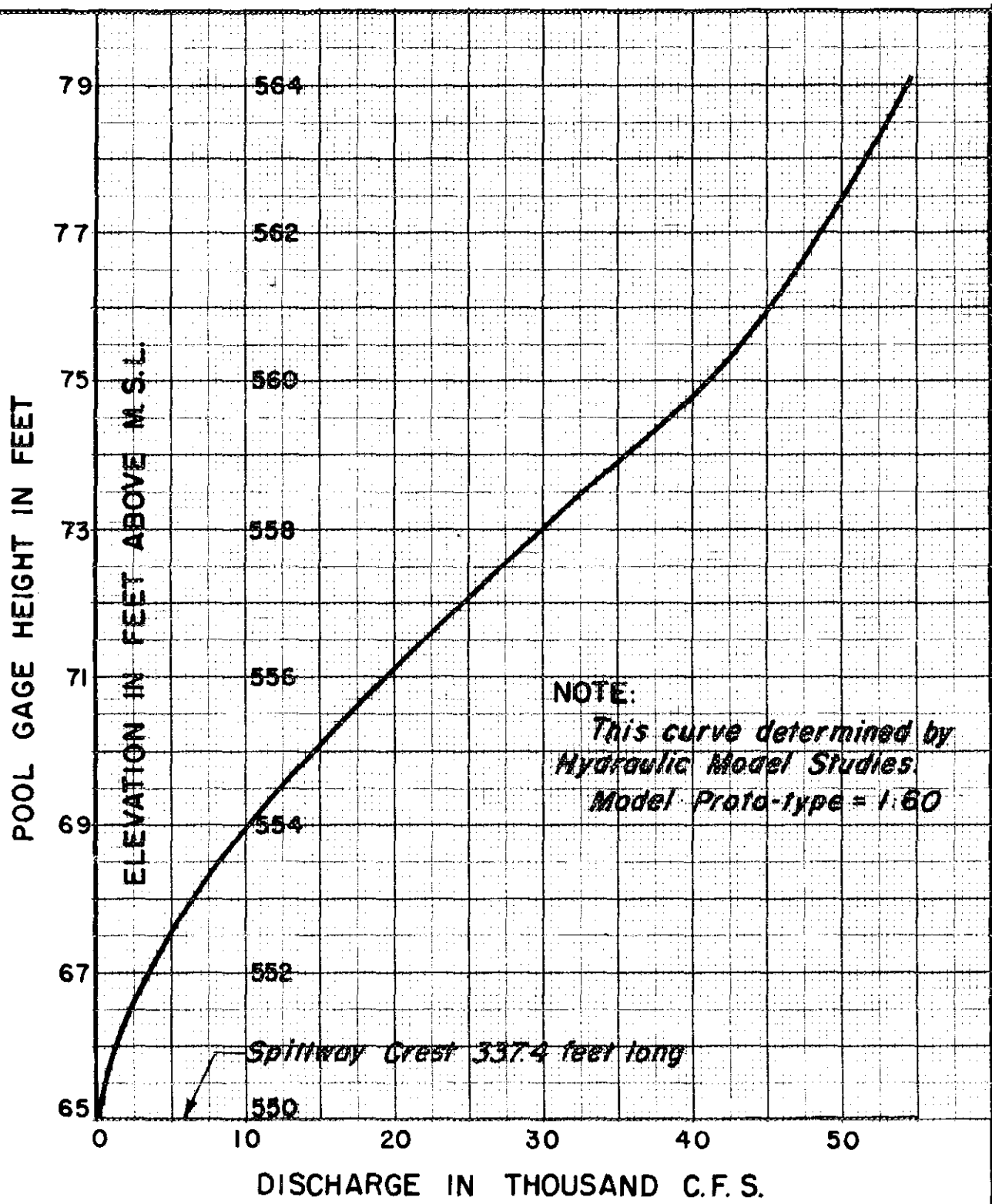
1. Telemark gage = 473.1 (Steady)
2. Reservoir stage = 47.0.
3. From curves, reservoir discharge = 400 c.f.s.



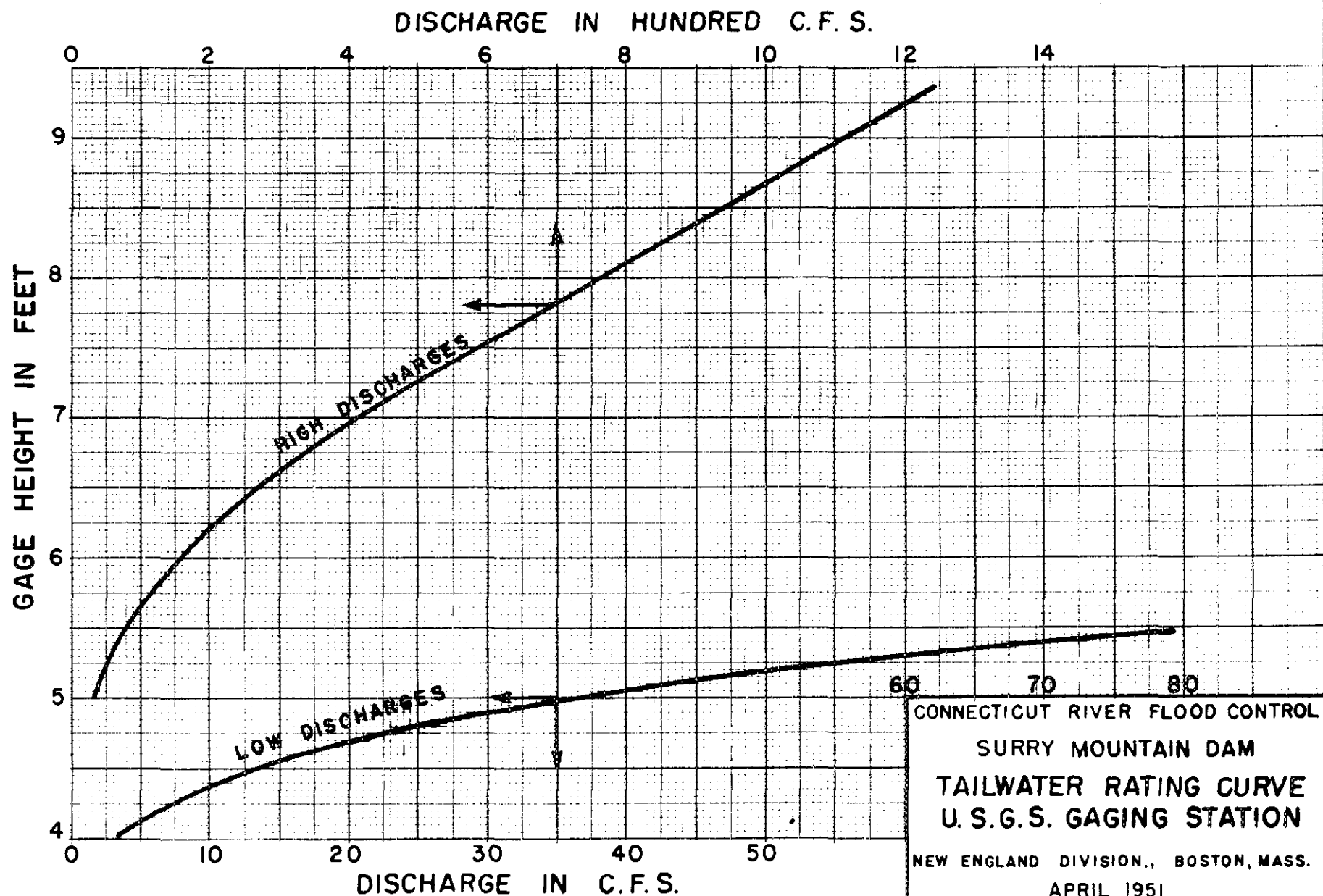
CONNECTICUT RIVER FLOOD CONTROL
SURRY MOUNTAIN RESERVOIR
DISCHARGE REGULATION
PHASES II AND III
NEW ENGLAND DIVISION, BOSTON, MASS.
APRIL 1951

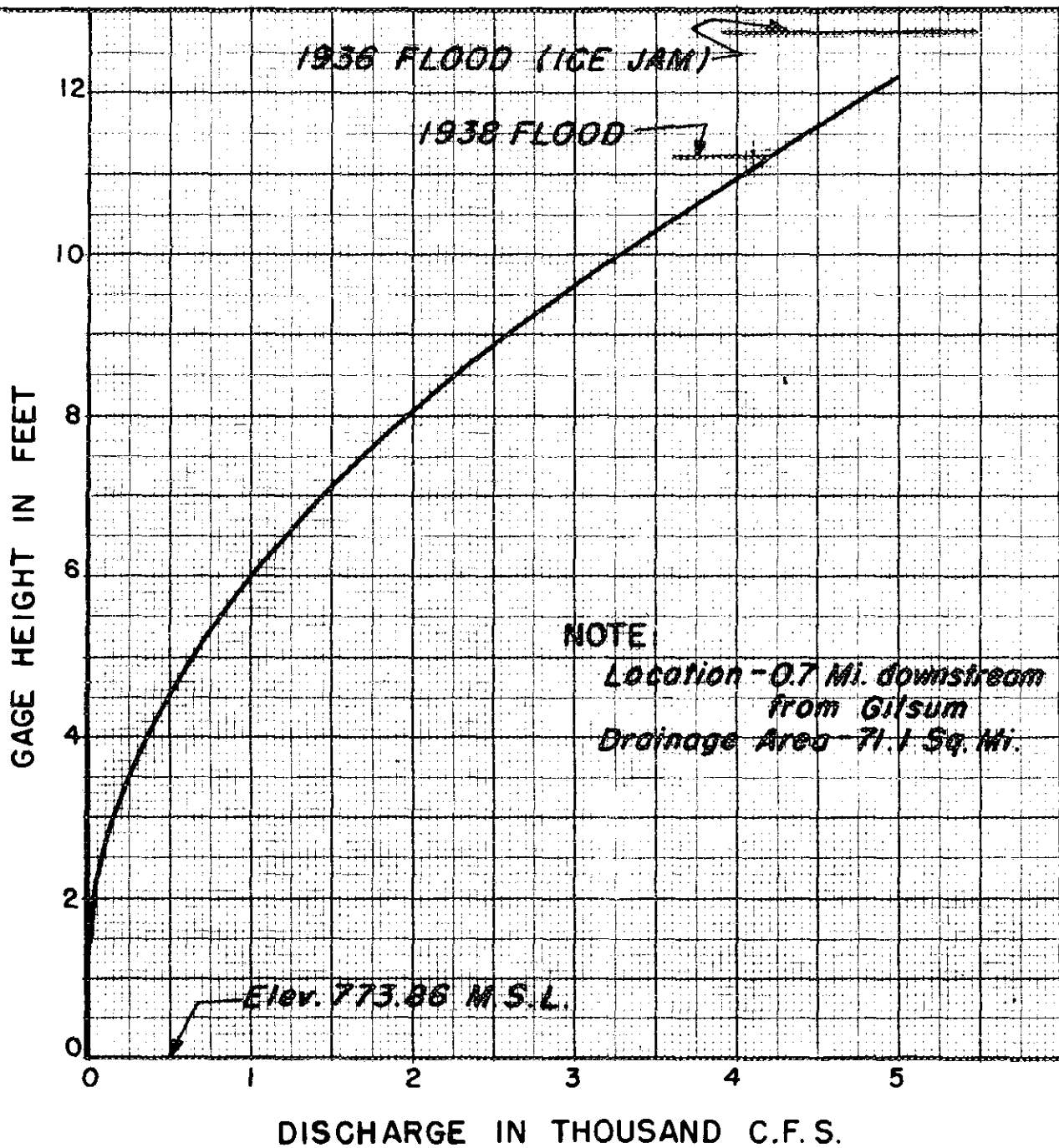


CONNECTICUT RIVER FLOOD CONTROL
 SURRY MOUNTAIN DAM
 OUTLET RATING
 CURVES
 NEW ENGLAND DIVISION., BOSTON, MASS.
 APRIL 1951

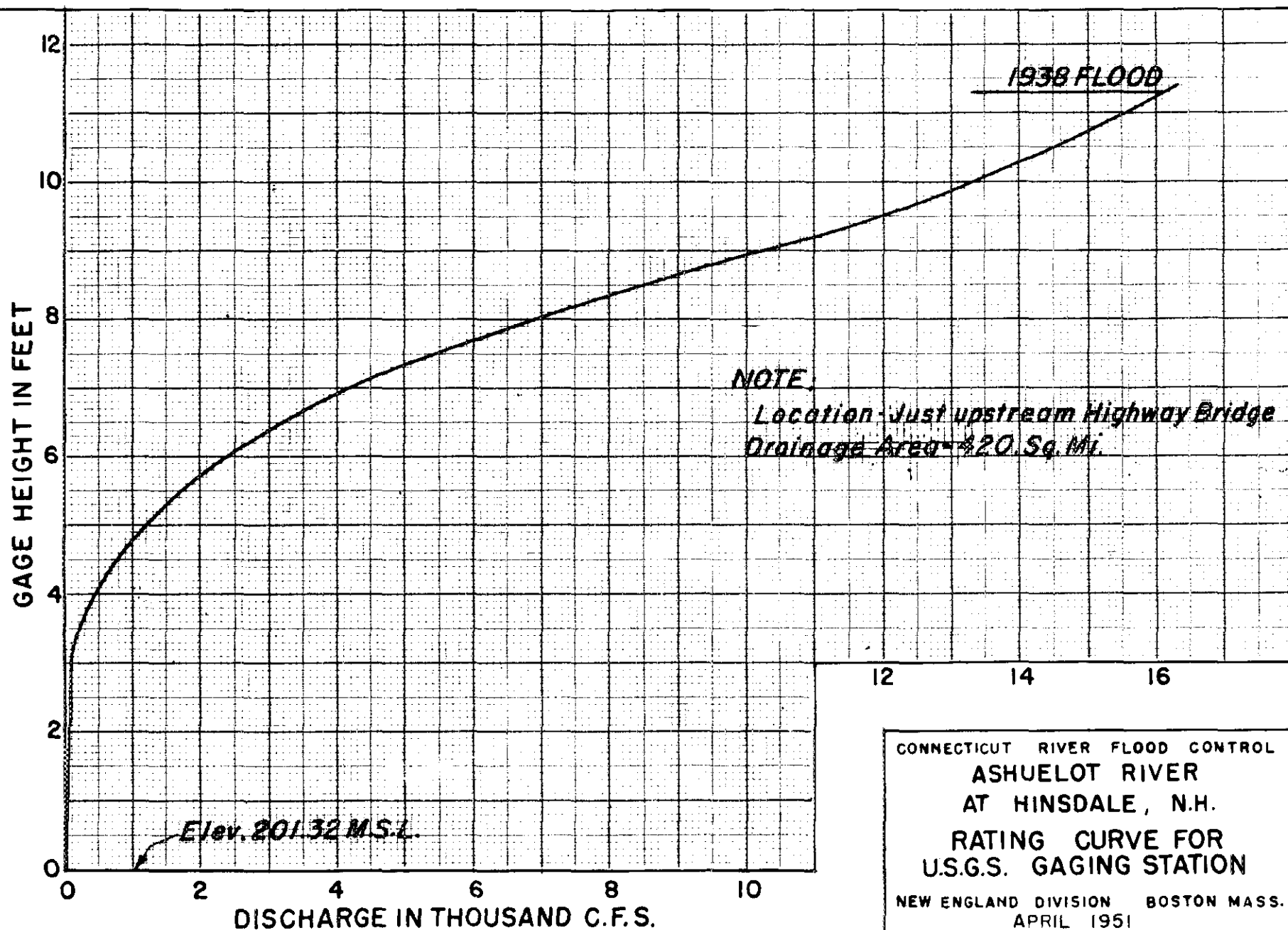


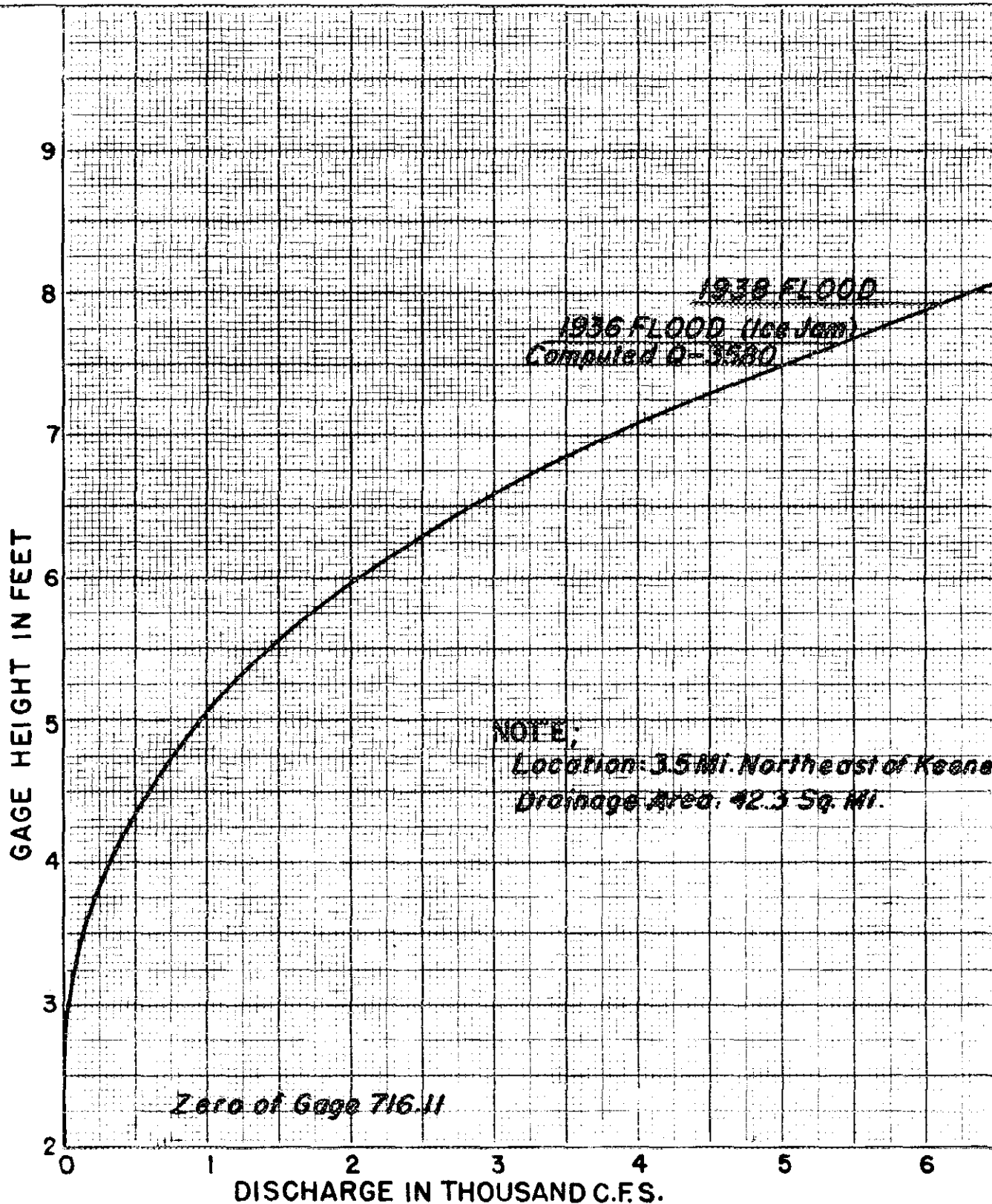
CONNECTICUT RIVER FLOOD CONTROL
SURRY MOUNTAIN DAM
SPILLWAY RATING
CURVE
NEW ENGLAND DIVISION., BOSTON, MASS.
APRIL 1951





CONNECTICUT RIVER FLOOD CONTROL
ASHUELOT RIVER
NEAR GILSUM, N. H.
RATING CURVE FOR
U.S.G.S. GAGING STATION
NEW ENGLAND DIVISION., BOSTON, MASS.
APRIL 1951

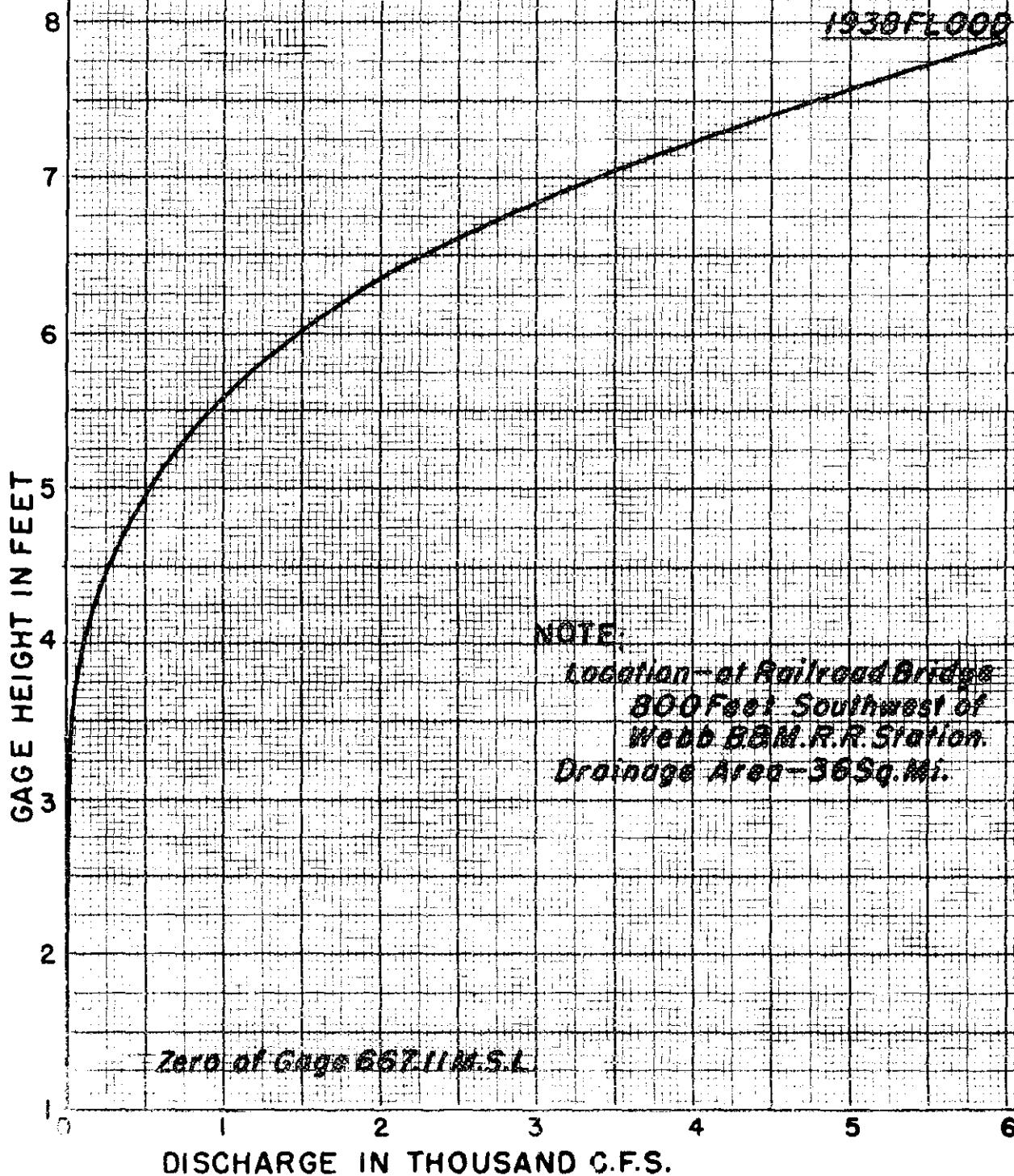




CONNECTICUT RIVER FLOOD CONTROL
OTTER BROOK
NEAR KEENE, N.H.

RATING CURVE FOR
U.S.G.S. GAGING STATION

NEW ENGLAND DIVISION BOSTON, MASS.
APRIL 1951



CONNECTICUT RIVER FLOOD CONTROL
SO. BRANCH ASHUELOT RIVER
AT WEBB NEAR MARLBORO, N.H.
RATING CURVE FOR
U.S.G.S. GAGING STATION
NEW ENGLAND DIVISION BOSTON, MASS.
FEBRUARY 1951.

REGULATION OF SURRY MT. RESERVOIR

LOG OF REPORTS AND INSTRUCTIONS

DATE & HOUR	RES. POOL		GATE OPENING		OUTFLOW C.F.S.	KEENE GAGE		RAIN		BY
	HOUR	STAGE	1	2		HOUR	ELEV.	HOUR	INCHES	
3/15	8 A	17.8	3	3	780		469.3			
	12 N	19.3	3	3	820		470.1			
	4 P	20.8	3	3	870		470.9			
	Rise due to snow melt - Temp. past 48 hrs., Max. 55°, Min. 38° - About 8" of snow on ground.									
3/15	4:30 P	Called R.S.R. - Informed that W.B. H.L. forecast indicated continued warm weather with rain beginning late P.M. - Instructed to close gate #1 & watch telemark gage.								
3/15	4:45 P		0	3	(Closed gate #1)					
	7 P	22.4	0	3	440		471.4			
	Moderate rain beginning 6:45 P									
H.L.	7:15 P	Called R.S.R. - Instructed to close gate #2 and to check telemark gage and call about 11 P.								
3/15	7:30 P	23.0	0	0	(Closed gate #2)					
	9 P	24.8	0	0	-		471.6			
	11 P	27.0	0	0			471.8	10:45 P	0.30	
H.L.	11:55 P	Called R.S.R. - Instructed to check for damage in Keene and call in about 7 A.								
3/16	1 A	29.8	0	0			471.9		0.50	
	3 A	31.9	0	0			472.0		0.72	
	5 A	33.0	0	0			472.4		1.29	
	Precip. at Stoddard 6 A 1.29 (Total) Bradford 6:30 A 1.38 (Total)									
	6:45 A	36.2	0	0			Hard Rain		1.28	
H.L.	7:1 A	Called R.S.R. and reported above data - Also advised him that no damage occurring in Keene - Estimated that some nuisance damage would begin shortly - Instructed to call about 11 A								

WAR DEPARTMENT
CORPS OF ENGINEERS
NEW ENGLAND DIVISION
BOSTON, MASS.

S A M P L E

GATE OPERATION RECORD

Reservoir SURRY MOUNTAIN

Date	Time	Gate Openings* in feet				Reservoir Gate-ft.	Remarks
		#1	#2	#3	#4		
4-5-51	8:10A	0.0	2.5			49.45	
	9:55A	0.0	3.0			49.60	Open to 600 c.f.s. Instructions by R.S.R.
	12:05P	0.0	3.5			49.70	Open to 700 c.f.s. Instructions by E.C.
	1:05P	0.0	3.7			49.75	
	4:05P	2.0	2.0			49.90	Open to 800 c.f.s. Instructions by E.C.
	11:15P	2.1	2.2			50.00	Open to 850 c.f.s. Instructions by R.S.R.
4-6-51	9:35P	2.3	2.3			50.05	
4-7-51	9:20A	2.0	2.3			49.65	Reduce to 800 c.f.s. Instructions by R.C.R.
	10:00A	1.9	2.0			49.60	
	11:00A	2.0	2.0			49.60	
	3:45P	2.0	1.7			49.60	Reduce to 700 c.f.s. Instructions by R.S.R.
	4:25P	1.7	1.7			49.60	
	6:55P	1.7	1.8			49.60	
4-8-51	8:50A	1.9	1.9			49.65	Open to 800 c.f.s. Instructions by R.S.R.

* Indicate fully opened gate by "F"

Signed /s/

Operator

Harry G. Lawton

Date 9 April 1951